CHAPTER 3
AIRWORTHINESS STANDARDS
TRANSPORT CATEGORY ROTORCRAFT

MISCELLANEOUS GUIDANCE (MG)

AC 29 MG 3. ROTORCRAFT AND SYSTEMS CERTIFICATION FOR CATEGORY II OPERATIONS.

a. Explanation.

(1) Category II instrument approach and landing minimums variations are based on ground facilities and environment, aircraft equipment, crew training, crew proficiency, and maintenance programs. For the pilot, the approach and landing minimums final consideration is the runway visibility which can be, and usually is, related to a cloud ceiling, although the concept is that if there is a runway visibility of 4,000 feet, as an example, there is a very high probability that the ceiling will be at least 300 feet. Therefore, Category I minimums are weather conditions of not less than a 200-foot ceiling and ½-mile visibility or runway visual range (RVR) of 2,400 feet. Category II minimums permit approaches at less than 200 feet decision height/RVR 2,400 to as low as 100 feet/RVR 1,200. Category III approach minimums are less than Category II but will not be discussed here.

(2) The ground facilities required for a Category II approach and landing include specific approach lighting extending more than 3,000 feet from the runway, thus eliminating any present heliports from being approved for Category II operations. Therefore, the following Category II approvals procedures for rotorcraft assume an approach to a runway at airspeeds at or above V_{MINI}.

(3) The regulations and advisory material covering the approval for IFR Category II operations are included in Part 91, Appendix A, and AC 91-16, Category II Operations - General Aviation Airplanes. Those references address airplanes; however, the concept is also suitable for the approval of rotorcraft for Category II operations. The equipment to be required and the procedures to be followed are basically the same for a rotorcraft as for an airplane. Additional reference material concerning Category II approval is contained in FAA Order 8440.5A, General Aviation Operations Inspection's Handbook, and AC 120-29, Criteria for Approving Category I and Category II Landing Minimum for FAR 121 Operations.

(4) Authority for rotorcraft to use Category A airplane minimums is contained in § 97.3(d)(1). FAA Order 8440.5, §§ 97.3, 91.6, and Appendix A of Part 91 provide authority to consider the rotorcraft as a small, Category A aircraft and relief from the requirement for two pilots and two sets of instruments and equipment. Any rotorcraft that is presented for Category II certification must first meet the requirements for rotorcraft instrument flight (Appendix B of Part 29 and paragraph AC 29.1543).

(5) In addition to the ground facilities and environment noted above, there are requirements in three other general areas to obtain Category II approval. These are certification of the aircraft and systems, certification and continuation training of flight crews, and a continuing maintenance program for the aircraft and Category II required systems. The entire Category II approval requires a Category II manual that covers all of these areas. FAA/AUTHORITY approval of this manual would normally be the responsibility of the operations and airworthiness inspectors that grant the approval to an operator for Category II operations.

(6) The additional equipment necessary for a Category II approval consists of the flight control guidance system. This system can be either a flight director system or an automatic approach coupler. A flight director system needs only to present computed steering data for the instrument landing system (ILS) localizer and should present at least raw glideslope data on the same instrument as the localizer steering commands. A single-axis steering autopilot could be used if it coupled to the ILS localizer. In a practical sense, however, contemporary rotorcraft flight director and automatic pilot systems use at least two-axes command guidance or coupling, and some provide coupling or guidance in three axes; localizer, glidepath, and airspeed. A marker beacon system or a radio altimeter is required for operations with decision heights of 150 feet or less. A rotorcraft flight manual (RFM) supplement is required to define the configuration limitations and procedures for Category II operation.

b. Procedures.

(1) Instrumentation. Test instrumentation is required to provide a time history of the following parameters throughout each approach:

- Localizer deviation.

- Glideslope deviation.

- Radar altitude (if available).

These parameters can be acquired from the cockpit display for each one. The localizer and glideslope deviations are normally recorded as a microampere deviation from the centerline on a continuous strip recording. The radar altitude is continuously recorded as feet above the ground on the same recording device. Any type of recorder that produces a time history of these parameters throughout the approach would be satisfactory. However, a recorder that can be read during, or immediately after, each approach is recommended. This will allow the acceptability of the tracking during the approach to be determined immediately after each approach.

In addition to the above data, cockpit data should be hand recorded on a format similar to that shown in AC 91-16, Attachment 3 (figures AC 29 MG 3-1 and AC 29 MG 3-2).

(2) Systems Evaluation.

(i) The major portion of a Category II approval is the evaluation of the flight guidance system. To certify the flight guidance system for a specific model rotorcraft, a demonstration of 50 ILS approaches with a 90 percent success rate (as defined in Part 91) must be accomplished. If the flight guidance system has not been previously certificated in the rotorcraft, a certification program should be completed for the system before the Category II evaluation is started. It should be determined that the flight guidance system does comply with all the certification requirements before 50 ILS approaches. This is particularly true of an autopilot system where hardover malfunctions must be considered.

(ii) The equipment to be installed for Category II operations must meet the performance criteria specified in AC 120-29, Appendix 1. This material details the criteria for approval of airborne equipment and its installations to meet Category II performance. This appendix covers the rotorcraft flight manual, the systems ground tests, and the installation requirements and tests. Transport category rotorcraft should meet the same systems performance requirements as transport category airplanes.

(iii) The flight demonstration required for Category II system approval is explained in Part 91, Appendix A, Paragraph (e). The accuracy requirements for the tracking equipment are included in Appendix 1 of AC 120-29. The usual method of determining the tracking accuracy is by measuring the localizer and glideslope deviations in microamperes and printing them on a continuous strip recorder. The observed cockpit date should also be recorded on a form similar to that in AC 91-16, Attachment 3 (figures AC 29 MG 3-1 and AC 29 MG 3-2). Each approach made during the evaluation should have a complete set of data.

(iv) Coupler systems that require manual trimming by the pilot to center the AFCS actuators should be carefully evaluated, especially in turbulent conditions or gusty crosswinds. These systems may not meet the trim requirements at the 100-foot decision height or may not provide sufficient tracking accuracy without excessive pilot attention and workload.

(v) The effects of coupler system hardover malfunctions should be evaluated in all axes to determine the minimum decision height. The altitude loss that would occur from a nose down hardover at the decision height should be determined. This altitude loss should be included in the rotorcraft flight manual with the appropriate limitation on the minimum height above the ground for operation with the coupler engaged.

(vi) It is recommended that the demonstration approaches be made to Category II ILS facilities, although this is not required by either Part 91, Appendix A, or AC 91-16. Many Category I ILS installations do not provide good enough signals at the lower altitudes for the precise tracking required for Category II operations. In many cases, this is due to the effects of terrain or buildings off the approach end of the runway. Nevertheless, if satisfactory accuracy can be attained, all the approaches

required for a Category II approval may be made at Category I facilities. During the flight test, especially if simulated IFR conditions are used in good weather, the approach control and control tower of the facility being used should be advised that Category II operations are being conducted. The Category II ILS clear areas must be kept unobstructed to allow satisfactory ILS signals. The air traffic control agencies should assure that taxiing aircraft, airfield maintenance trucks, and other airfield traffic are kept out of the critical areas during the data-gathering approaches. These agencies can also monitor the ILS facility for proper operation to Category II standards and can advise the test aircraft if abnormal operation occurs.

(3) Rotorcraft Flight Manual. Upon satisfactory completion of an engineering inspection and test program, the FAA/AUTHORITY Rotorcraft Flight Manual (RFM), or supplements thereto, should reflect the following:

(i) The limitations, if any.

(ii) Revision to the performance section, if appropriate.

(iii) A statement of Category II approval to the effect that “The airborne instruments and equipment meet the performance standards for Category II approaches” and the following note:

“NOTE: Compliance with the performance standards referenced above does not constitute approval to conduct Category II operations.

CATEGORY II APPROACH EVALUATION

Pilot in Command _____ Second in Command _____ Date _____

Registration No. _____ Airport _____ Runway _____ Weather _____ Wind _____

FAA Inspector _____

This form will be completed whenever an approach is attempted utilizing the airborne low approach system, regardless of whether the approach is abandoned or concluded succesfully.

APPROACH EVALUATION

1. Was the approach successful? YES ☐ NO ☐
2. Flight control guidance system used
   a. Auto-coupler ☐
   b. Flight director ☐
   c. If equipped and used, did a and b agree? YES ☐ NO ☐
      Second in Command? YES ☐ NO ☐
      FAA Inspector? YES ☐ NO ☐
3. Airspeed at middle marker ± ___ at 100' ± ___ from programmed speed?
4. If unable to initiate ☐ or complete ☐ approach (indicate which), was reason due to:
   a. Airborne equipment ☐. Identify and describe nature of deficiency.
   b. Ground equipment ☐. Identify and describe nature of deficiency.
   c. Approach control or tower request ☐.
   d. Other ☐. State reason.
5. Was airplane in trim at 100' for continuation of flare and landings?
   YES ☐ NO ☐
6. If approach and landing abandoned, state altitude above runway: _____
   feet (State reasons)_____
   _____
7. Quality of overall performance: Good ☐ Acceptable ☐ Unacceptable ☐

_____
Pilot in Command's Signature

FIGURE AC 29.MG 3-1

CATEGORY II APPROACH EVALUATION (cont.)

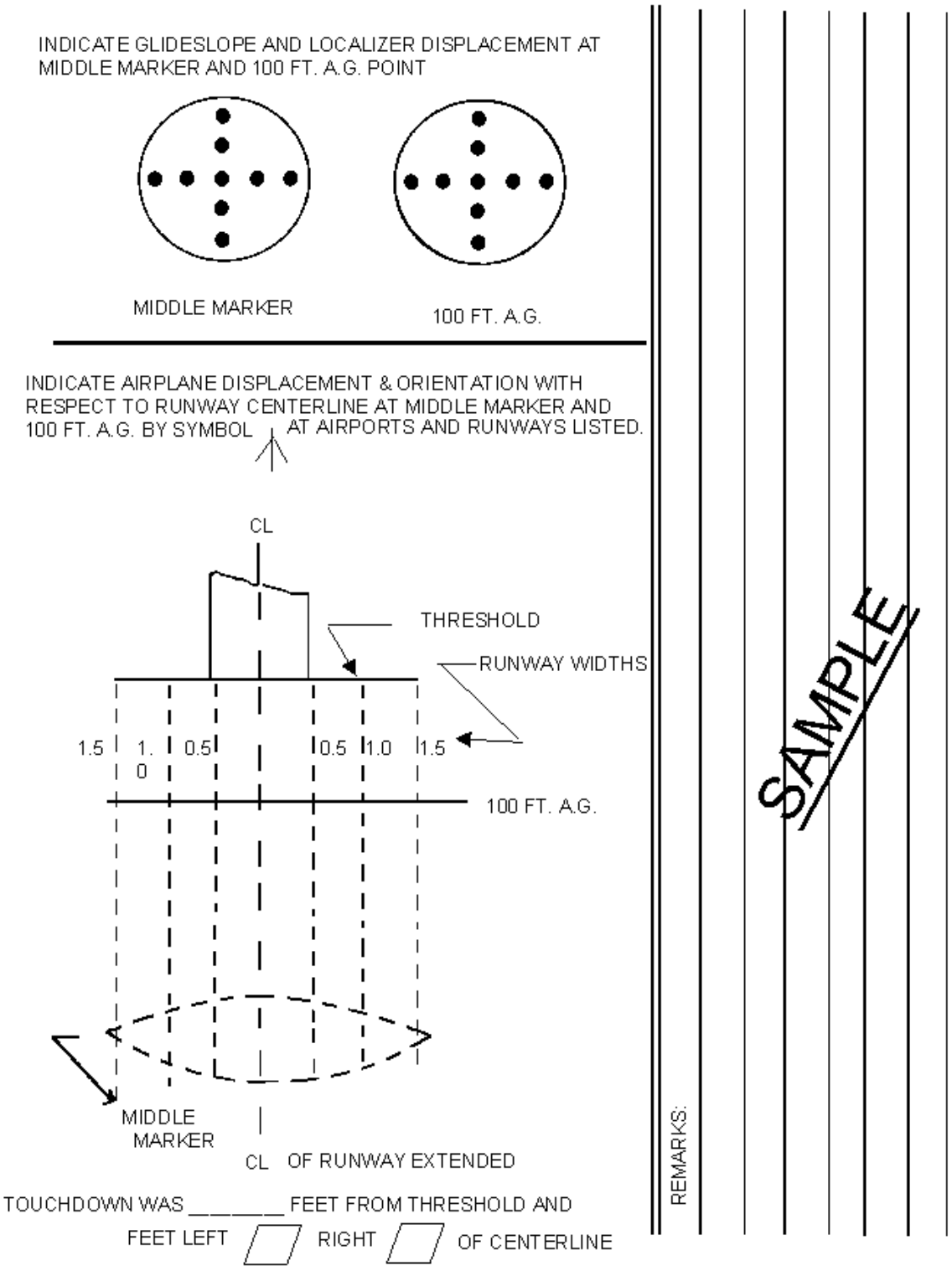

FIGURE AC 29.MG 3-2